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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/414,520	10/08/1999	KAZUE TAKAHASHI	503.37698X00	3400

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EXAMINER	
ZERVIGON, RUDY	
ART UNIT	**PAPER NUMBER**
1763	

DATE MAILED: 10/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/414,520	TAKAHASHI ET AL.	
	Examiner	Art Unit	
	Rudy Zervigon	1763	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 September 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *6,7,9 and 10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *6,7,9 and 10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Satou et al (U. S. Pat. 5,961,850) in view of Tokunaga, Takafumi et al (US 5,874,013 A). Satou et al teaches:

i. a plasma ECR processing apparatus (Figure 1, column 2, lines 32-58) having a vacuum processing chamber (Figure 1, item 10, column 3, lines 10-15)

ii. a sample table (Figure 1, item 11, column 2, lines 32-58) for mounting the sample (Figure 1, item 13, column 2, lines 32-58) which is processed in the vacuum processing chamber

iii. a plasma generation means (Figure 1, column 2, lines 45-52), wherein a plasma etching (column 2, lines 59-67; column 4, lines 32-36) of an insulating film (column 5, line 11) is carried out by generating a plasma in response to introduction of a gas (column 2, lines 59-62) which generates a plasma

iv. A temperature of a region (items 36, 37; column 2, lines 52-58) which forms a side wall of the vacuum processing chamber is controlled to have a range of 10 °C to 120 °C (column 3, lines 10-21)

v. A plasma processing (column 2, lines 59-67) apparatus wherein as a means for adjusting a temperature of the vacuum wall, a temperature adjusted coolant (column 3, lines 22-23) medium is used.

Satou et al does not teach:

vi. A microwave frequency in the 300MHz to 1GHz range

vii. plasma generation means which generates a plasma in which the degree of plasma dissociation is a "middle" degree and the gas species containing carbon and fluorine is generated fully in the plasma

Tokunaga teaches a plasma etching ECR method (Figure 1, column 7, lines 55-65) including:

viii. A microwave frequency in the 300MHz to 1GHz range (column 1; lines 30-35)

ix. plasma generation means which generates a plasma in which the degree of plasma dissociation is a "middle" degree – column 5, lines 5-36

x. carbon and fluorine plasma species - column 5, lines 5-36

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Satou to use Tokunaga's plasma ECR etching method of microwave frequency range and selective plasma dissociation of carbon and fluorine species as taught by Tokunaga.

Motivation for Satou to use Tokunaga's plasma ECR etching method of microwave frequency range and selective plasma dissociation of carbon and fluorine species as taught by Tokunaga is to for performing standard plasma etching of semiconductor wafers under "selective" plasma conditions as taught by Tokunaga (column 1, lines 7-35; column 5, lines 5-42).

3. Claim 7, 9, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Satou et al (U. S. Pat. 5,961,850) and Tokunaga, Takafumi et al (US 5,874,013 A) in view of Ohtake, Hiroto et al (US 6,054,063 A). Satou and Tokunaga are discussed above. Satou further teaches his plasma processing (column 2, lines 59-67) apparatus wherein as a means for adjusting a

temperature of the vacuum wall, a temperature adjusted coolant (column 3, lines 22-23) medium is used.

Satou and Tokunaga do not teach plasma electron energies in the range of 0.25eV and 1eV.

Satou and Tokunaga do not teach intermittent microwave application.

Ohtake teaches a plasma etching method (Figure 1; column 2, lines 35-64; column 4; lines 55-67) including pulsed microwave application for maintaining electron temperatures ("energies") below 2eV (column 5; lines 6-14; claim 4).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Satou and Tokunaga to use Ohtake's intermittent microwave application method for maintaining an etching method with electron energies below 2eV.

Motivation for Satou and Tokunaga to use Ohtake's intermittent microwave application method for maintaining an etching method with electron energies below 2eV is for effecting high-speed etching (column 3, line 64 – column 4, line 3) and controlling negative ion density (column 5; lines 6-14).

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272.1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official fax phone number for the 1763 art unit is (703) 872-9306. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the

examiner can not be reached please contact the examiner's supervisor, Gregory L. Mills, at (571) 272-1439.

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